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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,120	10/10/2003	Christof Baur	34003.55	2728
27683	7590	04/07/2005	EXAMINER	
HAYNES AND BOONE, LLP 901 MAIN STREET, SUITE 3100 DALLAS, TX 75202			BERMAN, JACK I	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/684,120	Applicant(s) BAUR ET AL.	
	Examiner Jack I. Berman	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 24-28 is/are allowed.
- 6) ☒ Claim(s) 1-23 and 29-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/25/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 29-37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Independent claim 29 contains the limitation that the scanning probe microscope is caused "to vertically move nanoscale objects from another position on the passive surface to the target position." However, contrary to this characterization, it is the lateral movement of the scanning probe microscope in combination with the vertical movement that moves the nanoscale objects from another position on the passive surface to the target position, not the vertical movement alone. For purposes of examination, claim 29 has been treated as if it read (in part): "...a processing unit operable to read the computer readable medium and operate under the control of the control algorithms and the fabrication design to cause the scanning probe microscope to depassivate sites of the passive surface associated with the target positions and to vertically move nanoscale objects away from another position on the passive surface, laterally to a position above the target position, and then vertically to the target position."

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 6-23, 29-35, and 38-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. in view of Eigler. Initially, it should be noted that the claims rejected over this combination of references in the previous Office action was intended to be “1-3, 6-23, and 33-35”, not “1-3, 6-23, and 3-35” as written. The examiner apologizes for this typographical error. As regards to substance, as was explained in the aforementioned action, Yamada et al. discloses a system for manipulating nanoscale objects comprising a passive surface on a substrate (at lines 25-26 in column 15 the example is given of a sapphire substrate with a passive (insulated) surface of hydrogen while at lines 55-58 in column 1, lines 41-46 in column 15, and lines 38-48 in column 16, the patent indicates that hydrogen-terminated silicon can be used as the substrate) and a scanning probe microscope (Yamada et al. uses a scanning tunneling microscope) wherein the scanning probe microscope has a tip that moves toward the surface to depassivate sites (remove hydrogen atoms from the sites) to form target positions for the subsequent placement of nanoscale objects (Yamada et al. gives the example of Mg atoms at lines 26-30 in column 15). While Yamada et al. does not state that fabrication design parameters comprising information on selected locations on the passive surface where target positions are to be formed for the subsequent placement of nanoscale objects and control algorithms operable to control operations of the scanning probe microscope are stored on a computer readable medium and that a processing unit operable to read the computer readable medium and operate under the control of the control algorithms and the fabrication design to cause the scanning probe

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microscope to depassivate sites of the passive surface associated with the target positions is provided, the range of movements of the scanning probe microscope are smaller than a human operator can perceive or control directly so the standard practice is to provide such processing units to control scanning probe microscopes in accordance with stored algorithms and selected site location data. It would therefore have been obvious to a person having ordinary skill in the art to provide the Yamada et al. system with a computer readable medium containing the required fabrication design parameters and control algorithms and a processing unit to read the medium and act in accordance with the stored parameters and algorithms. Yamada et al. does not specify the source of the nanoscale objects to be deposited at the target positions by the scanning probe microscope tip; however, at lines 45-50 in column 1, Yamada et al. does state that the techniques for manipulating atoms required by the system disclosed in the Yamada et al. patent are those disclosed in the Eigler patent. This patent teaches that the atoms to be manipulated by a scanning probe microscope tip may be deposited on the surface of a substrate. The manipulation is then done by forming a bond between at least one of the plurality of nanoscale objects and the scanning probe microscope tip; moving the scanning probe microscope tip with the at least one nanoscale object bonded thereto to one of the target positions; forming a bond between the nanoscale object and the target position; and breaking the bond between the scanning probe microscope tip and the nanoscale object. It would therefore have been obvious to a person having ordinary skill in the art to use the Eigler method to provide and manipulate the nanoscale objects (atoms) required by the Yamada et al. system since Yamada et al. states that this method represents the state of the art. Yamada et al. also teaches to image the substrate surface to confirm bond formation and breaking between the scanning probe microscope tip and the nanoscale objects, as is illustrated by the scanning tunneling microscope photographs shown in

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Figures 17 and 18. At lines 50-52 in column 15, Yamada et al. teaches that the temperature of the environment in which the disclosed method of manipulating nanoscale objects is practiced should be controlled in order to avoid thermal diffusion. Since Eigler teaches at lines 66-68 in column 3 that the method of using a scanning probe microscope to manipulate nanoscale objects can even be used to move the objects between different substrates, it would have been obvious to a person having ordinary skill in the art to use the method in the Yamada et al. system to move the objects between parts of a substrate that lie on different planes.

Claims 4, 5, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. and Eigler as applied to claims 1-3, 6-23, 29-35, and 38-48 above, and further in view of Beton et al. While Yamada et al. and Eigler both teach to use scanning probe microscope tips to manipulate atoms, Beton et al. teaches that C₆₀ fullerene molecules can also be manipulated in the same way. It would therefore have been obvious to a person having ordinary skill in the art to use the Yamada et al./Eigler method discussed above to move C₆₀ fullerene molecules to the target positions.

Claims 24-28 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not teach to provide nanoscale objects with reactive sites covered by caps that can be removed by a scanning probe microscope tip.

Applicant's arguments filed January 25, 2005 have been fully considered but they are not persuasive. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re*

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Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). According to page 15 of the arguments:

“...Yamada is completely silent as to the location of the magnesium atoms prior to and during the formation of the vacated hydrogen sites. Further, Yamada is completely silent as to forming target positions on the passive surface after the deposition of the nanoscale objects. Further still, Yamada is completely silent as to the formation of a chemical or physical bond between a nanoscale object and a scanning probe microscope tip followed by movement of the nanoscale object in upward and downward directions.

Yamada refers to Eigler as the “state of the art” for manipulating atoms, and contains no independent description of methods for the manipulation of atoms. Therefore, the manipulation techniques described by Yamada are at best limited to those described by Eigler.

Eigler describes a method for repositioning an atom on a substrate using an STM. (Abstract.) Eigler is completely devoid, however, of disclosure or suggestion for depositing nanoscale objects on a passive surface, forming a target position at a position on a passive surface after deposition of nanoscale objects on the surface, and forming a chemical or physical bond between a nanoscale object and a scanning probe microscope tip followed by movement of the nanoscale object in an upward and downward direction. Thus, Eigler does not provide the disclosure or suggestion that is lacking in Yamada with respect to claims 1-3 and 6-23.”

While this argument admits that Yamada et al. suggests using the manipulating techniques described by Eigler, it treats each reference individually and does not address the basis of the actual rejection, the Yamada et al. system of using a scanning probe microscope to form target positions on a passive surface and using the techniques taught by Eigler to move nanoscale objects to these target positions. It is true, as applicant argues, that neither reference explicitly states that the nanoscale objects are deposited on the passive surface before the target positions are formed, however, these objects must be *someplace* before they are moved to the target positions. As was explained in the previous Office action, Eigler teaches that such nanoscale objects may be deposited on the surface of a substrate prior to being moved by a scanning probe microscope to new positions. It would therefore have been obvious to a person

having ordinary skill in the art to deposit the nanoscale objects on Yamada et al.'s passivated surface in the manner disclosed by Eigler before Yamada et al.'s target positions are formed so that the objects can then be moved to these target positions in the manner taught by Eigler.

Applicant is incorrect in stating that "Eigler is completely devoid ... of disclosure or suggestion for... forming a chemical or physical bond between a nanoscale object and a scanning probe microscope tip followed by movement of the nanoscale object in an upward and downward direction." This method of moving nanoscale objects is clearly disclosed at line 66 in column 3 through line 10 in column 4.

Applicant also argues:

"Beton does not disclose, motivate or suggest forming target positions on a passive surface after the deposition of a nanoscale object on the surface. Furthermore, Beton does not disclose, motivate or suggest movement of nanoscale objects in an upward and downward direction, and from one location on a surface to a target position on the surface. Further still, Beton is completely silent as to the formation of a chemical or physical bond between a nanoscale object and a scanning probe microscope tip followed by movement of the nanoscale object in upward and downward directions."

Again, the rejection is based on the combination of Yamada et al., Eigler, and Beton et al., not Beton et al. alone, so this argument is irrelevant.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period


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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jack I. Berman
Primary Examiner
Art Unit 2881

jb
4/4/05